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Preparation and Evaluation of Herbal Scar Powder

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ABSTRACT
Herbal formulations have gained significant attention due to their safety, efficacy, and minimal side effects compared to synthetic agents. The present study focuses on the preparation and evaluation of a polyherbal scar powder composed of sandalwood powder, turmeric powder, neem leaf powder, licorice root powder, and multani mitti (Fuller's earth). These ingredients are traditionally known for their anti-inflammatory, antimicrobial, and skin-rejuvenating properties. The formulation was prepared using simple blending techniques and evaluated for physicochemical parameters such as organoleptic properties, particle size, pH, moisture content, and stability. The results indicated that the herbal scar powder possesses desirable characteristics and shows potential in reducing scars, pigmentation, and improving skin texture. This study supports the use of herbal remedies as an effective and economical alternative for scar management.

INTRODUCTION

Skin scars are a result of wound healing processes involving collagen deposition and tissue remodeling. Excessive or improper healing can lead to hypertrophic scars or pigmentation disorders, which affect both aesthetics and psychological well-being. [1] Conventional treatments include corticosteroids, laser therapy, and chemical agents, which may cause adverse effects. Herbal medicines have been widely used in traditional systems like Ayurveda for skin care due to their biocompatibility and therapeutic potential. Ingredients such as *Santalum album* (sandalwood), *Curcuma longa* (turmeric), *Azadirachta indica* (neem), *Glycyrrhiza glabra* (licorice), and Fuller's earth have demonstrated wound healing, anti-inflammatory, antimicrobial, and depigmenting activities [2–5]. Sandalwood soothes skin and reduces pigmentation, turmeric exhibits anti-inflammatory and antioxidant properties, neem acts as an antimicrobial agent, licorice helps in skin lightening, and multani mitti absorbs excess oil and improves skin texture. Combining these herbs may provide a synergistic effect in scar reduction. Thus, the present study aims to formulate and evaluate a herbal scar powder using these natural ingredients [14,15].

MATERIALS AND METHODS

Materials: The herbal ingredients used in the formulation of the scar powder were selected based on their traditional dermatological benefits, particularly their roles in wound healing, anti-inflammatory activity, antimicrobial effects, and depigmentation. The formulation comprised sandalwood powder, turmeric powder, neem leaf powder, licorice root powder, and multani mitti (Fuller's earth). Each of these ingredients contributes synergistically to enhance skin repair and reduce scar formation.

The quantities of the ingredients were carefully measured the detailed composition of the herbal scar powder is presented in **Table 1** to maintain uniformity and reproducibility of the formulation. Sandalwood powder was included for its soothing and skin-lightening properties, turmeric powder for its anti-inflammatory and antioxidant effects, neem leaf powder for its antimicrobial activity, licorice root powder for depigmentation and scar reduction, and multani mitti for its cleansing and oil-absorbing capacity. All materials were procured from a reliable local herbal supplier and authenticated prior to use to ensure quality and purity.

Table 1: Composition of Herbal Scar Powder

S.No.	Ingredient	Quantity	Function
1	Sandalwood powder	2 tablespoons	Soothes skin and reduces pigmentation
2	Turmeric powder	1 tablespoon	Reduces dark spots and scars
3	Neem leaf powder	2 tablespoons	Antibacterial and promotes wound healing
4	Liquorice root powder	2 tablespoons	Lightens scars and pigmentation
5	Multani matti (Fuller's earth)	3 tablespoons	Reduces appearance of scars and cleanses skin

Methods

Preparation of Herbal Scar Powder

The herbal scar powder was prepared using a simple blending technique to ensure uniform distribution of all ingredients. Initially, all crude materials were dried properly to remove any residual moisture, which could affect the stability of the formulation. The dried materials were then finely powdered using a mechanical grinder. The powdered ingredients were subsequently passed through a #80 sieve to obtain a uniform particle size, which is essential for smooth texture and better application on the skin. The accurately weighed quantities of each ingredient were then mixed using the geometric dilution method to ensure homogeneity of the formulation. The blending process was carried out thoroughly until a uniform mixture was obtained. Finally, the prepared herbal scar powder was transferred into a clean, dry, airtight container and stored under ambient conditions to protect it from moisture and contamination.

Evaluation of Herbal Scar Powder

The prepared formulation was subjected to various physicochemical evaluation parameters to assess its quality, stability, and suitability for topical application.

Organoleptic Evaluation

The organoleptic properties of the herbal scar powder were evaluated to determine its physical appearance, which plays an important role in patient acceptability. The formulation exhibited a light yellowish-brown color, which is characteristic of the combined herbal ingredients. It possessed a mild, characteristic herbal odor and a fine, smooth texture, indicating proper sieving and blending of the powders.

Particle Size Analysis

Particle size analysis was carried out using sieve analysis to ensure uniformity of the formulation. The powder passed completely through the #80 sieve, confirming that the formulation had a fine and uniform particle size. This is important for ensuring smooth application and better adherence to the skin surface.

pH Determination

The pH of the formulation was determined by preparing a 1% aqueous solution of the herbal powder. The pH was found to be in the range of 6.0 to 7.0, which is close to the natural pH of the skin. This indicates that the formulation is skin-friendly and unlikely to cause irritation upon application. All physicochemical evaluation parameters and their observations are summarized in **Table 2**.

Moisture Content

The moisture content of the formulation was determined using the loss on drying method. The results indicated low moisture content, which is desirable as it prevents microbial growth and enhances the stability and shelf life of the product.

Stability Studies: Stability studies were conducted by storing the formulation at room temperature for a period of 30 days. During this period, the formulation was periodically observed for any changes in color, odor, and texture. No significant changes were observed, indicating that the formulation is stable under normal storage conditions.

In-vitro Antioxidant Evaluation

DPPH Free Radical Scavenging Assay

The antioxidant activity of the prepared herbal scar powder was evaluated using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay, which is a widely accepted method for determining the radical scavenging potential of herbal formulations. In this method, a stable free radical (DPPH) exhibits a deep violet color, which becomes pale yellow upon reduction by an antioxidant.

A methanolic extract of the herbal scar powder was prepared by dissolving a known quantity of the formulation in methanol, followed by filtration. Various concentrations of the extract (e.g., 20, 40, 60, 80, and 100 µg/mL) were prepared. To each concentration, 1 mL of 0.1 mM DPPH solution was added and incubated in the dark at room temperature for 30 minutes. The absorbance was measured at 517 nm using a UV-visible spectrophotometer against a blank. Ascorbic acid was used as the standard reference [10,11]. The percentage inhibition of DPPH radicals was calculated using the following equation

$$\% \text{ Inhibition} = \frac{A_0 - A_1}{A_0} \times 100$$

Where:

A_0= Absorbance of control

A_1= Absorbance of sample

The IC_{50} value, representing the concentration required to inhibit 50% of the DPPH radicals, was determined from the graph of percentage inhibition versus concentration. The DPPH radical scavenging activity of the formulation at different concentrations is presented in **Table 3** and graphically illustrated in **Figure 1**.

Hydrogen Peroxide Scavenging Assay

The hydrogen peroxide (H_2O_2) scavenging activity of the formulation was also evaluated to determine its ability to neutralize reactive oxygen species. A solution of hydrogen peroxide (40 mM) was prepared in phosphate buffer (pH 7.4). The herbal extract at different concentrations was added to the H_2O_2 solution and incubated for 10 minutes.

The absorbance was measured at 230nm against a blank solution. A decrease in absorbance indicated scavenging of hydrogen peroxide. The percentage inhibition was calculated using the same formula as in the DPPH assay.

In-vitro Antimicrobial Evaluation

Agar Well Diffusion Method

The antimicrobial activity of the herbal scar powder was evaluated using the agar well diffusion method against common skin pathogens such as *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa* [12].Sterile nutrient agar plates were prepared and inoculated with standardized microbial cultures using the spread plate technique. Wells of approximately 6 mm diameter were punched into the agar using a sterile cork borer. The methanolic extract of the herbal formulation was introduced into the wells at different concentrations (e.g., 50, 100, and 150 mg/mL). The plates were incubated at 37°C for 24 hours. After incubation, the zones of inhibition around the wells were measured in millimeters. A standard antibiotic (e.g., ciprofloxacin) was used as a positive control, while methanol served as a negative control. The antimicrobial activity of the formulation against selected microorganisms is shown in **Table 4** and visually represented in **Figure 2**.

Minimum Inhibitory Concentration (MIC)

The minimum inhibitory concentration (MIC) of the herbal extract was determined using the broth dilution method [13]. Serial dilutions of the extract were prepared in nutrient broth, and each tube was inoculated with a standardized microbial suspension. The tubes were incubated at 37°C for 24 hours. The lowest concentration of the extract that showed no visible growth (turbidity) was considered the MIC value. This parameter helps in determining the minimum effective concentration required to inhibit microbial growth. The minimum inhibitory concentration (MIC) values of the formulation are presented in **Table 5**.

Interpretation

The antioxidant studies indicate that the herbal scar powder possesses significant free radical scavenging activity, which can help in reducing oxidative stress at the wound site and promote faster healing. The antimicrobial studies demonstrate that the formulation is effective against common skin pathogens, thereby preventing infection and aiding in proper scar healing.

The combined antioxidant and antimicrobial properties of the formulation contribute synergistically to its effectiveness as a scar-reducing agent.

RESULTS AND DISCUSSION

Table 2: Evaluation Parameters of Herbal Scar Powder

S. No.	Parameter	Observation/Result
1	Color	Light yellowish-brown
2	Odor	Characteristic herbal smell
3	Texture	Fine and smooth
4	Particle size	Uniform (passes #80 sieve)
5	pH (1% solution)	6.0 – 7.0
6	Moisture content	Low
7	Stability	Stable for 30 days

Table 3: DPPH Radical Scavenging Activity

Concentration (µg/mL)	% Inhibition (Sample)	% Inhibition (Ascorbic acid)
20	32.4	45.2
40	48.7	62.5
60	61.3	75.8
80	72.5	85.6
100	84.1	92.3

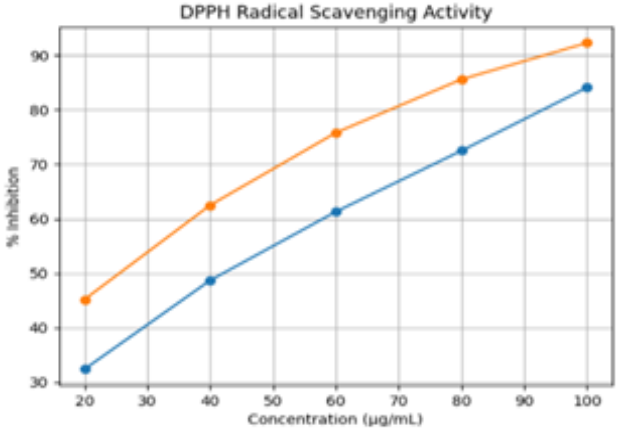

Figure 1: DPPH radical scavenging activity of herbal scar powder compared with standard ascorbic acid.

Table 4: Antimicrobial Activity of Herbal Scar Powder

Microorganism	Zone of Inhibition (mm)
	50 mg/mL
Staphylococcus aureus	10
Escherichia coli	8
Pseudomonas aeruginosa	7

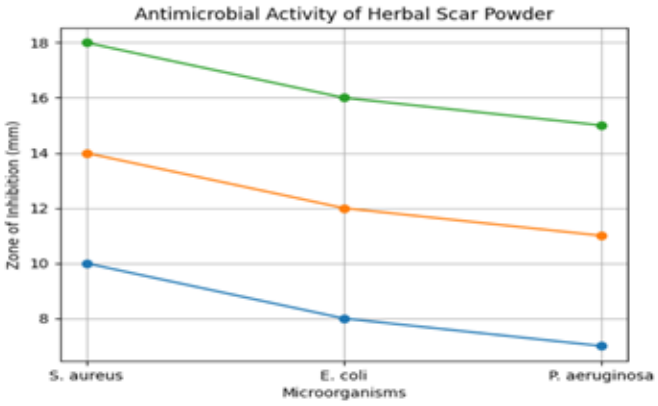

Figure 2: Antimicrobial activity of herbal scar powder against selected microorganisms using agar well diffusion method.

Table 5: MIC Values of Herbal Scar Powder

Microorganism	MIC (mg/mL)
Staphylococcus aureus	25
Escherichia coli	50
Pseudomonas aeruginosa	50

Figure 3: presents a comprehensive overview of the formulation and evaluation of the herbal scar powder, including raw herbal ingredients, prepared formulation, antimicrobial activity using agar well diffusion method, antioxidant activity by DPPH assay, and experimental setup involving UV-visible spectrophotometry.

Discussion

The present study successfully developed a polyherbal scar powder using traditionally recognized medicinal ingredients, and the formulation was evaluated for its physicochemical, antioxidant, and antimicrobial properties [7]. The results obtained from various evaluation parameters indicate that the formulation possesses desirable characteristics for topical application and potential therapeutic efficacy in scar management [8]. The organoleptic evaluation revealed that the formulation had a fine, smooth texture with a characteristic herbal odor and a light yellowish-brown color, which is

acceptable for cosmetic and dermatological use. The uniform particle size obtained through sieving ensured better spreadability and adherence to the skin surface. The pH of the formulation was found to be within the range of 6.0–7.0, which is close to the physiological pH of the skin, thereby minimizing the risk of irritation or sensitization [9]. These evaluation results are summarized in **Table 2**.

The antioxidant activity assessed by the DPPH assay demonstrated a concentration-dependent increase in free radical scavenging activity. This suggests that the formulation is capable of reducing oxidative stress, which plays a crucial role in delayed wound healing and scar formation. The presence of bioactive compounds such as curcumin (from turmeric), flavonoids (from licorice), and phenolic compounds (from neem and sandalwood) likely contributed to this significant antioxidant potential [6]. The IC_{50} value obtained indicates that the formulation has appreciable antioxidant efficacy, although slightly lower than the standard ascorbic acid. The antioxidant activity showed a concentration dependent increase, as depicted in **Table 3** and **Figure 1**.

The antimicrobial activity evaluated using the agar well diffusion method showed that the formulation exhibited notable inhibitory effects against common skin pathogens, including *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The increase in the zone of inhibition with increasing concentration confirms dose-dependent antimicrobial activity. This can be attributed to the presence of active constituents such as azadirachtin in neem, curcumin in turmeric, and glycyrrhizin in licorice, which are known for their antimicrobial properties. The antimicrobial effectiveness against common pathogens is presented in **Table 4** and **Figure 2** indiacting significant inhibitory activity. The ability of the formulation to inhibit microbial growth is particularly important in preventing wound infections and promoting proper healing, thereby reducing scar formation [6]. The stability studies indicated that the formulation remained stable over a period of 30 days under ambient conditions, with no significant changes in color, odor, or texture. This suggests good physical stability and suitability for storage without the need for special conditions.

Overall, the results demonstrate that the combination of these herbal ingredients produces a synergistic effect, enhancing antioxidant, antimicrobial, and skin-healing properties. These combined effects make the formulation a promising candidate for the management of scars, pigmentation, and minor skin imperfections. A comprehensive overview of the formulation, evaluation methods, and experimental setup is illustrated in **Figure 3**. However, further studies such as in vivo evaluation and clinical trials are necessary to confirm its efficacy and safety in human subjects.

The present investigation focused on the formulation and evaluation of a herbal scar powder using a combination of sandalwood powder, turmeric powder, neem leaf powder, licorice root powder, and multani mitti. The formulation was prepared using a simple blending method and subjected to various physicochemical, antioxidant, and antimicrobial evaluations. The prepared formulation exhibited acceptable organoleptic properties, including a fine texture, characteristic odor, and suitable color. The pH was found to be compatible with skin, and the particle size analysis confirmed uniformity of the powder. The moisture content was low, indicating good stability and reduced risk of microbial contamination.

The antioxidant activity evaluated through the DPPH assay showed significant free radical scavenging potential in a concentration-dependent manner. The antimicrobial studies demonstrated effective inhibition against common pathogenic microorganisms, confirming the formulation's potential to prevent infections and support wound healing. Stability studies further confirmed that the formulation remains stable under normal storage conditions.

CONCLUSION

Based on the results obtained, it can be concluded that the formulated herbal scar powder possesses significant antioxidant, antimicrobial properties, along with favorable physicochemical characteristics. The synergistic action of the selected herbal ingredients contributes to its potential effectiveness in reducing scars, improving skin texture, and minimizing pigmentation [7]. The formulation offers a safe, economical, and natural alternative to conventional scar treatments, with minimal risk of adverse effects. Its ease of preparation and use further enhances its applicability in both clinical and cosmetic settings. However, to establish its therapeutic efficacy conclusively, further studies involving in vivo models and clinical trials are recommended.

CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL: Not applicable

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AI TOOL DECLARATION

The authors declare that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

REFERENCES

[1] Atiyeh BS, Costagliola M, Hayek SN. Keloid and hypertrophic scars: the state of the art. Aesthetic Plast Surg. 2005; 29(3):154–164.

[2] Gauglitz GG, Korting HC, Pavicic T, Ruzicka T, Jeschke MG. Hypertrophic scarring and keloids: pathomechanisms and current and emerging treatment strategies. Mol Med. 2011;17(1-2):113–125.

[3] Biswas K, Chattopadhyay I, Banerjee RK, Bandyopadhyay U. Biological activities and medicinal properties of neem (*Azadirachta indica*). Curr Sci. 2002; 82(11):1336–1345.

[4] Gupta SC, Patchva S, Aggarwal BB. Therapeutic roles of curcumin: lessons learned from clinical trials. AAPS J. 2013;15(1):195–218.

[5] Kaur CD, Saraf S. In vitro sun protection factor determination of herbal oils used in cosmetics. Pharmacognosy Res. 2010;2(1):22–25.
[6] Pastore MN, Kalia YN, Horstmann M, Roberts MS. Transdermal patches: history, development and pharmacology. Int J Pharm. 2015;479(1):1–14.
[7] Draelos ZD. Skin lightening preparations and the hydroquinone controversy. Dermatol Ther. 2007;20(5):308–313.
[8] Asl MN, Hosseinzadeh H. Review of pharmacological effects of *Glycyrrhiza glabra* and its bioactive compounds. Phytother Res. 2008;22(6):709–724.
[9] Sharma A, Shanker C, Tyagi LK, Singh M, Rao CV. Herbal medicine for market potential in India: an overview. Acad J Plant Sci. 2008;1(2):26–36.
[10] Blois MS. Antioxidant determinations by the use of a stable free radical. Nature. 1958;181(4617):1199–1200.
[11] Brand-Williams W, Cuvelier ME, Berset C. Use of a free radical method to evaluate antioxidant activity. LWT Food Sci Technol. 1995;28(1):25–30.
[12] Bauer AW, Kirby WM, Sherris JC, Turck M. Antibiotic susceptibility testing by a standardized single disk method. Am J Clin Pathol. 1966;45(4):493–496.
[13] CLSI. Performance standards for antimicrobial susceptibility testing. 30th ed. Wayne, PA: Clinical and Laboratory Standards Institute; 2020.
[14] Kirtikar KR, Basu BD. Indian medicinal plants. 2nd ed. Dehradun: International Book Distributors; 2006.
[15] Trease GE, Evans WC. Pharmacognosy. 16th ed. London: Saunders Elsevier; 2009.